ME-7965

BOGEN®
A DIVISION OF LEAR SIEGLER, INC.

SOLID STATE PUBLIC ADDRESS AMPLIFIERS

Models C35, C60, & C100

DESCRIPTION

The Bogen Challenger C series public address amplifiers are fully transistorized, rated at 35 watts in Model C35, 60 watts in Model C60, and 100 watts in Model C100. All units will accommodate two high-impedance microphones which may be connected simultaneously with individual volume controls provided for each microphone input. Two auxiliary inputs are provided for a tuner, tape recorder, or phonograph with a ceramic or crystal cartridge. A fader volume control selects and adjusts the level of the desired auxiliary input and permits a gradual changeover from one input to the other. A master volume control sets the overall level of the mixed inputs. Separate bass and treble controls permit adjustments for tonal balance.

Balanced or single-ended outputs are provided for standard speaker impedances and 25-volt center tapped and 70-volt constant voltage systems. Two quick-disconnect plugs provide rapid and convenient connections to speakers. Output jacks are provided for feeding a tape recorder or additional booster amplifier, and for connecting a WMT-1 accessory to match the output to a 500/600-ohm telephone line.

The amplifiers operate from a 120V, 60Hz source. Model C35 has a .93 ampere circuit breaker, C60 a 1.65 ampere, and C100 a 2.5 ampere circuit breaker. Power requirements for the individual models are shown in the Technical Specifications.

INSTALLATION

UNPACKING

Your amplifier was carefully checked before leaving the factory. Inspect the shipping container and unit carefully for indication of improper handling. If the unit has been damaged, make an immediate claim to the distributor from whom it was purchased. If the amplifier was shipped to you, notify the transportation company without delay and place your claim.

POWER AND GROUNDING

The ac line cord has a three-prong plug which should be plugged into a three-wire grounded, 120 volt, 60 Hz outlet. Since it is important to ground the amplifier, where a three-wire outlet is not available use an adapter (e.g., Leviton No. 5017) and connect the grounding pigtail to the screw securing the wall plate. If the wall plate screw is not grounded, connect a wire from the GND terminal of the amplifier to a water or steam pipe.

AUXILIARY POWER

The auxiliary power receptacle on the rear chassis is a three-wire grounded outlet which can supply power to accessory equipment in the sound system. Be sure that the accessory component does not require more than 150 watts on the C35 and C60, and 300 watts on the C100. The power switch controls this receptacle and can be used to turn the auxiliary unit on and off. *

Associated equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded.

*** Caution**

Use the on-off switch on the phonograph for turning off a record player connected to the auxiliary receptacle. Do not use the amplifier power switch to stop the record player as this may cause flats to develop on the idler wheel of the phonograph.

INPUT CONNECTIONS

MICROPHONE: Two microphones may be connected to the amplifier simultaneously. Connect one to the MIC 1 receptacle and the second to the MIC 2 receptacle on the rear panel.

The microphones should be of the high-impedance ceramic, crystal, or dynamic type. Connect each microphone as shown in figure 1. The length of the interconnecting cable should be under 35 feet. For longer lines a suitable in-line transformer may be used with low impedance microphones.

MICROPHONE PRECEDENCE: Microphone precedence may be accomplished by connecting the circuit shown in figure 2. The equipment consists of a microphone, a Y-adapter (Switchcraft Part No. 330F1), a single-conductor shielded cable (20 feet maximum length) and a SPDT switch. If the microphone switch has an extra set of contacts for controlling an external circuit, such as on the Shure Model 450, the SPDT switch is not required.

Plug the Y-adapter into the AUX 1 or AUX 2 input jack on the rear of the amplifier. Connect the program source and precedence switch to the Y-adapter, as shown in the figure. Connect the microphone input to the MIC 1 or MIC 2 input jack.

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TECHNICAL SPECIFICATIONS

	C35	C60	C100
POWER OUTPUT:	35 watts	60 watts	100 watts
FREQUENCY RESPONSE:	100 to 10,000 Hz ±2dB		80 to 10,000 Hz ±2 dB
HUM AND NOISE:	MIC Input 60 dB below rated output AUX Input 70 dB below rated output		
SENSITIVITY:	MIC Input 3 mV AUX Input 150 mV		
OUTPUTS:	8, 16 ohms 25 V C.T. (18 ohms) 70 V (143 ohms)	8, 16 ohms 25 V C.T. (10.4 ohms) 70 V (83 ohms)	4, 16 ohms 25 V C.T. (6.25 ohms) 70 V (50 ohms)
OUTPUT CONNECTIONS:	2 quick-disconnect type sockets with plugs provided, in addition to screw-type terminals, tape/booster jack, and provisions for WMT-1		
INPUTS:	2 microphone (high impedance), 2 auxiliary (high-impedance, high level) 500/600 ohm line with WMT-1 accessory		
TONE CONTROL ACTION:	2-Microphone Volume, 1 AUX 1-2 Volume (Fader), Master Volume, Bass, and Treble		
CONTROLS:	Treble @ 10 kHz ± 11 dB Bass @ 100 Hz ± 11 dB		
POWER REQUIREMENTS:	120 VAC 60 Hz		
	96W	170W	250W
SEMICONDUCTORS:	All Silicon		
	11 Transistors 5 Diodes		13 Transistors 5 Diodes
DIMENSIONS:	14-5/8" W x 3-3/4" H x 13-3/4" D (37.1 x 9.5 x 34.9 cm)		
WEIGHT:	14 lbs. (6.3 kg)	16 lbs. (7.2 kg)	18 lbs. (8.1 kg)

PHONO: Connect a phonograph (with ceramic or crystal cartridge) to either the AUX 1 or AUX 2 jack, using a single-conductor shielded cable terminated in a standard RCA phono plug. It is recommended that a separate ground wire be connected between the phono player base and the amplifier GND terminal to minimize hum pick-up. This ground wire is not required when using the Bogen Model LPC-4A phono player top.

AUXILIARY: The AUX inputs may be used for sources other than a phonograph. Any signal source having a high-level (.15-3V) output may be connected to these inputs. This includes such Bogen equipment as the Model LPC-4A phono player top, and Model TP160B AM/FM tuner.

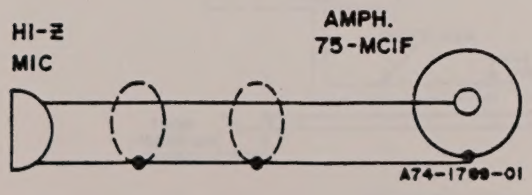


Figure 1 — Connecting Hi-Z Mic

OUTPUT CONNECTIONS

SPEAKERS: The amplifier may be used with most conventional speaker systems. For detailed information on the installation of multiple speaker systems, refer to the Speaker Installation Bulletin (No. 54-5001) included with this unit.

In permanent installations, where speakers will remain connected to the amplifier, connect the speaker system directly to the Speaker Output terminals on the rear of the amplifier. Connect one speaker lead to the COM terminal and the other to the terminal corresponding to the impedance of the speaker system. For balanced output lines, remove the link between COM and GND output terminals. If the line is shielded, connect the shield to GND. The 70V output is available only through the 3-pin connectors.

Caution

To minimize shock hazard, Class 1 wiring as defined in local building codes should be used for 70-volt outputs. All other outputs may use Class 2 wiring.

For frequently moved installations, connect the speaker to the speaker sockets on the rear panel. Two quick-disconnect plugs (Bogen Part No. 85-0147-01) are furnished with the amplifier to make connections to these sockets. Wiring of the speaker output plug is shown in figure 3.

When the speaker socket is used, connect the wired plug to either socket. Attach the impedance selector lead to the output terminal which corresponds to the speaker system impedance.

For 70-volt operation, it is only necessary to connect the wired plug to either quick-disconnect speaker socket, leaving the impedance selector disconnected. Note that the arrangement in figure 3 is for unbalanced speaker lines, with the link between COM and GND closed. For balanced lines, open the link between COM and GND.

CONNECTING AMPLIFIERS IN SERIES

Pairs of the same amplifier models can be connected in series to effectively double the power output into the same speaker system. See figure 4 for connection diagram. Be certain to remove the link between COM and GND of amplifier No. 2. Note that this arrangement is for unbalanced speaker lines. For balanced lines, remove the link between COM and GND of amplifier No. 1.

The input cabling must be arranged to parallel the inputs of the two amplifiers, and the volume and tone controls of both amplifiers must be at the same setting to assure that each amplifier will share the load equally.

TAPE RECORDING

To tape record the amplifier program, connect a patch cord from the TAPE/BOOSTER output jack to the input of the tape recorder. The patch cord should be single conductor, low-capacity shielded wire under 35 feet in length and terminated in a standard RCA phono plug.

ADDITIONAL BOOSTER AMPLIFIER

To drive a booster amplifier, connect a patch cord (see above) from the TAPE/BOOSTER output jack to the Hi-Z input of the booster amplifier.

OPERATION

POWER: The POWER switch turns the amplifier ON or OFF and controls power to equipment connected to the auxiliary power receptacle.

MIC 1, 2: The MIC controls are used to adjust the volume of the microphone inputs. Rotate the control clockwise (to the higher numbers) to increase volume. Set the control to the minimum position (0) when the microphone input is not used.

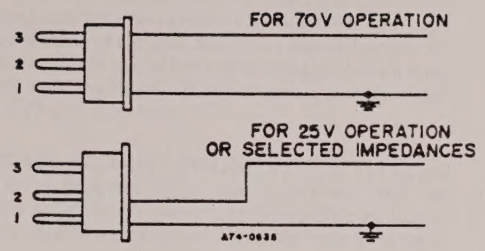


Figure 3 — Speaker Output Plug Wiring

AUX 1-AUX 2: This control selects either of the two auxiliary inputs, controls the volume of the selected input, and acts as a "fader" control, when both auxiliary inputs are connected.

Rotating this control counterclockwise, past the center position, selects the AUX 1 input and increases the AUX 1 volume. Rotating this control clockwise, past the center position, selects the AUX 2 input and increases the AUX 2 volume. By gradually and smoothly decreasing the level of one input and then increasing the other, you can "fade" from one input to the other.

MASTER: After the MIC and AUX input volume controls are used to mix the inputs as desired, rotate MASTER control to control the overall volume of the output signal. For most conditions the normal setting of the master control should be from 5 to 7.

BASS-TREBLE: The BASS and TREBLE controls are used to adjust the tonal balance of the amplifier output. The center position of these controls provides flat frequency response. Counterclockwise rotation of these controls reduces the bass or treble response, while clockwise rotation increases response.

The BASS control may also be used to remove low-frequency noise such as phono rumble or hum, while the TREBLE control can be used to reduce high-frequency noise, such as record scratch.

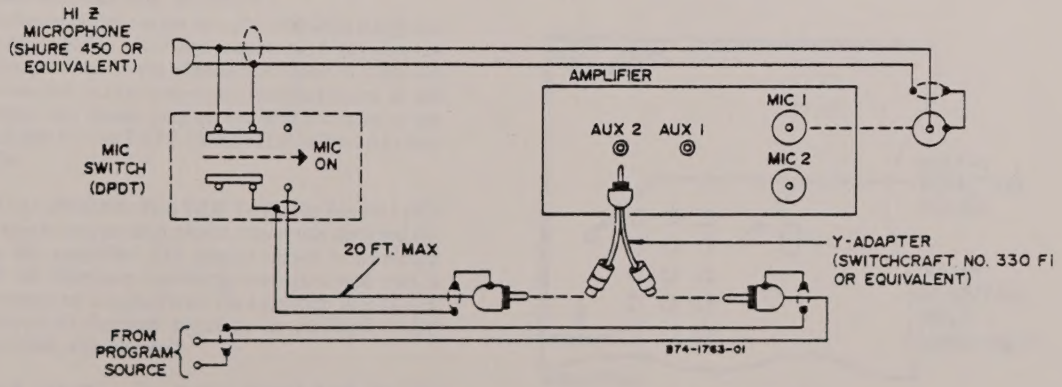


Figure 2 — Microphone Precedence Circuit

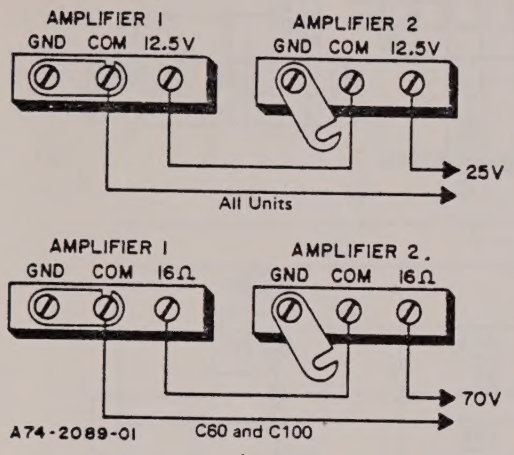


Figure 4 — Connecting Amplifiers in Series to Double Power Output

ACCESSORIES

Warning

Removing the amplifier cover presents an electrical shock hazard. Only a qualified technician should install this accessory.

WMT-1 LINE MATCHING TRANSFORMER: The Bogen WMT-1 line-matching transformer provides an impedance match between the amplifier and a 0 level, 500/600-ohm line. This may be a telephone line connected to the switchboard for internal paging or used with a wired music system. No soldering is required to connect the WMT-1 to the amplifier.

To connect the input from a balanced 500/600-ohm telephone line, remove the amplifier cover and mount the WMT-1 in the mounting holes provided on the chassis (see figure 5). Connect the input line to the three-screw terminal board on the WMT-1. Connect the phono plug on the WMT-1 cable to the AUX 1 or AUX 2 jack on the rear of the amplifier. If these jacks are being used for other sound inputs, the WMT-1 may be connected to one of the MIC inputs. In order to do this, the WMT-1 wiring must be modified as described in the instruction sheet supplied with the WMT-1.

To connect the amplifier output to a 500/600-ohm telephone line, remove the amplifier cover and mount the WMT-1 in the mounting holes provided in the chassis (see figure 5). Connect the 500/600-ohm line to the three-screw terminal board on the WMT-1. Connect the phono plug on the WMT-1 cable to the OUTPUT jack (next to the TAPE/BOOSTER jack) on the rear of the amplifier.

MODEL LPC-4A PHONO PLAYER TOP: The Model LPC-4A is a three-speed, ac operated phono player top designed for mounting on the amplifier. The phono player is furnished complete with all necessary mounting hardware, and only a screwdriver is required to install it on the amplifier. A tone arm housing a dual-stylus flip-over cartridge for standard or LP records is furnished with the unit.

RPK-34 RACK PANEL: The Bogen Model RPK-34 rack panel is designed to mount the amplifier in a standard 19-inch sound rack. The rack panel is finished in gray enamel.

CC12S CARRYING CASE AND SPEAKER: A Bogen Model CC12S carrying case with two speakers is available for portable systems. Each section of the case contains a high-efficiency 12-inch PM speaker and 25 feet of interconnecting cable with plug. Due to power handling limits, this accessory is recommended for use with C35 and C60 only.

LK-13 CONTROL GUARD LOCKING PLATE. The Bogen Model LK-13 is designed to prevent tampering with the controls of the amplifier. It comes complete with two sets of keys. The key cannot be removed when the lock is in open position.

MAINTENANCE

Caution

There are no user-replaceable parts within the unit. Have all internal servicing done by a qualified technician.

BOGEN SERVICE

We are interested in your Bogen equipment for as long as you have it. If trouble ever develops, do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, P.O. Box 500, Paramus, N.J. 07652.

When communicating with us, give the model and series designation of your unit. Describe the difficulty and include details on the electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If the trouble requires servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

When shipping your unit, pack the amplifier well, using the original shipping carton, or a similar container and filler material, to prevent damage in transit. Send the unit, fully insured and prepaid, via any responsible carrier. The unit will be promply repaired and returned to you.

CIRCUIT BREAKER

If the circuit breaker opens, the ac power lamp will go out and the amplifier will have no output, but there will be power at the AUX POWER receptacle at the rear panel. Set the ac power switch to off and momentarily depress the red button on the circuit breaker to reset it. Return the ac power switch to on. If the breaker trips again, do not attempt to reset it but have the trouble investigated by a qualified technician.

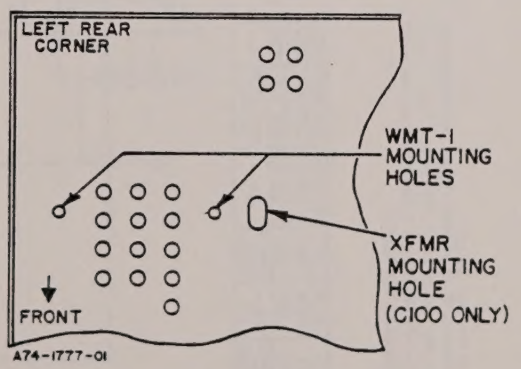
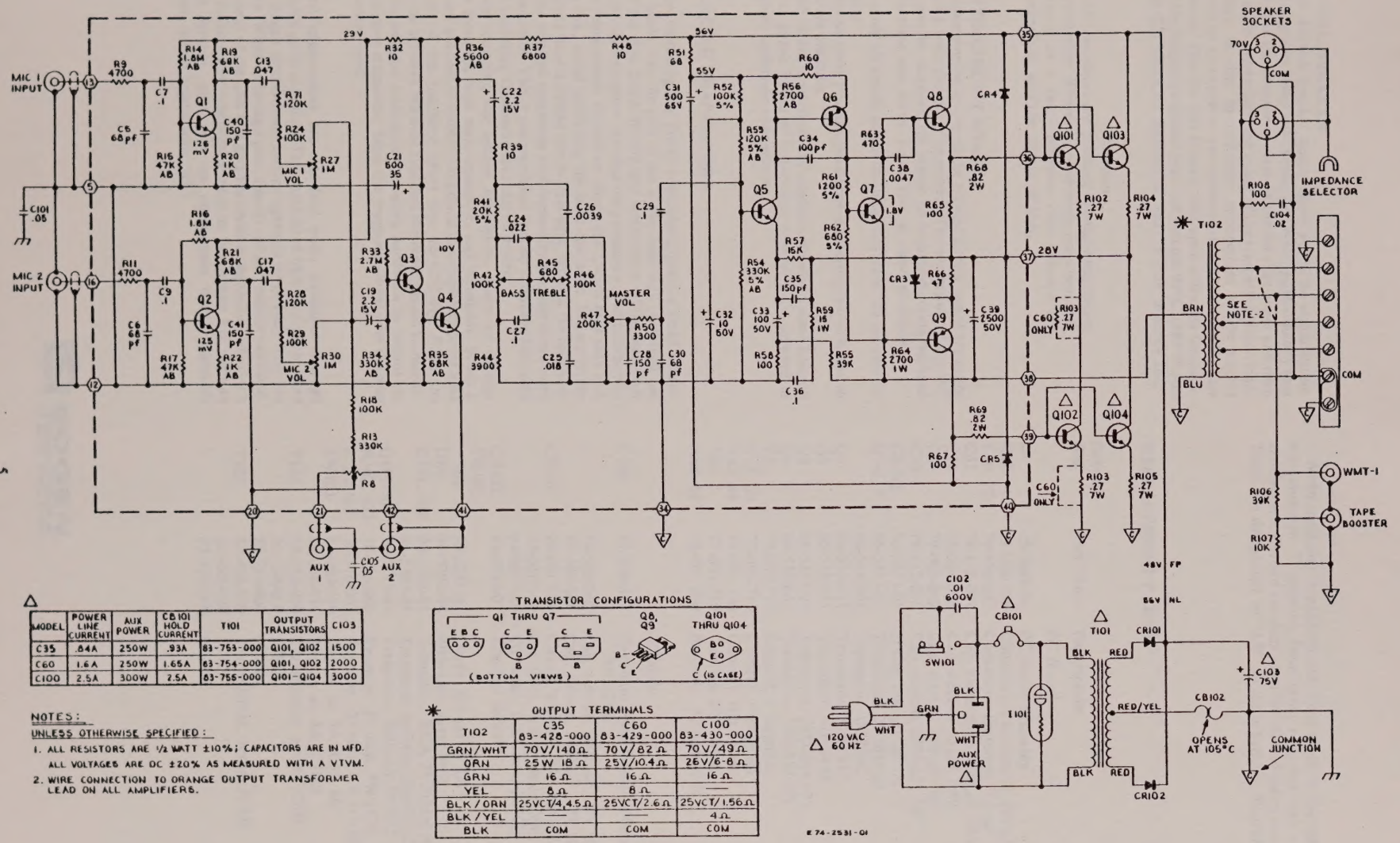


Figure 5 — Mounting Holes for WMT-1



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MODEL	POWER LINE CURRENT	AUX POWER	CB101 HOLD CURRENT	T101	OUTPUT TRANSISTORS	C103
C35	.84A	250W	.93A	83-753-000	Q101, Q102	1500
C60	1.6A	250W	1.65A	83-754-000	Q101, Q102	2000
C100	2.5A	300W	2.5A	83-755-000	Q101-Q104	3000

TRANSISTOR CONFIGURATIONS

✱ OUTPUT TERMINALS

T102	C35 83-428-000	C60 83-429-000	C100 83-430-000
GRN/WHT	70V/140Ω	70V/82Ω	70V/49Ω
GRN	25W 18Ω	25V/10.4Ω	26V/6-8Ω
GRN	16Ω	16Ω	16Ω
YEL	8Ω	8Ω	—
BLK/ORN	25VCT/4,4.5Ω	25VCT/2.6Ω	25VCT/1.56Ω
BLK/YEL	—	—	4Ω
BLK	COM	COM	COM

NOTES:

UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS ARE 1/2 WATT ±10%; CAPACITORS ARE IN MFD. ALL VOLTAGES ARE DC ±20% AS MEASURED WITH A VTVM.
2. WIRE CONNECTION TO ORANGE OUTPUT TRANSFORMER LEAD ON ALL AMPLIFIERS.

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Figure 6 — Models C35, C60, and C100 Amplifiers, Schematic Diagram

THERMAL BREAKER

If the thermal breaker opens, there will be no audio output but the ac power lamp will remain on. Wait approximately two minutes for the breaker to reset. If the breaker resets and then opens again, investigate the cause of the temperature overload. This may be due to improper connections at the output terminals or to excessive environmental heat with inadequate ventilation. The thermal breaker will open when the temperature at the output transistor heat sink reaches 90° C. (194° F.) on Models C35 and C60, and 105° C. (221° F.) on Model C100.

Caution

All transistors are soldered to ensure maximum reliability. When soldering leads, use a heat sink (such as a small alligator clip) between the transistor and the source of heat.

PRINTED CIRCUIT BOARD

All components on top of the printed circuit board are easily accessible with the cover removed. The underside of the PC board can be exposed for repair or troubleshooting without disconnecting any wires. To do this, proceed as follows:

a) Remove all knobs and mounting nuts from the six control shafts.
b) Remove three Phillips-head screws securing rear of board to chassis brackets.
c) Push board toward rear of chassis until shafts clear holes in front panel. Front of board may now be tilted upward to expose underside connections.

REPLACING TRANSISTORS

When replacing the driver transistors, press a small screwdriver blade into the side of the U-clip heat sink to spread the jaws of the clip. Draw the clip and screwdriver off the metal tab on the driver transistor. Reverse the procedure to install the clip on the replacement transistor. Since the U-clip heat sink is a spring clip, avoid spreading the jaws too wide. Where driver transistors have a finned clip or heat sink, remove the heat sink from the original transistor and replace by pushing down onto new transistor. This is accomplished best by installing heat sink before soldering transistor into circuit board.

When replacing the output transistors, clean all foreign matter from the heat sink, insulator, and transistor. Brush a generous amount of silicon compound to completely cover both surfaces of the insulator (Part No. 16-9278-01). Place the insulator between the heat sink and the replacement transistor. Use the original transistor mounting hardware to mount the replacement transistor. Snap the transistor cover over the heat sink where used.

Most components are standard parts available through reputable parts suppliers. The parts listed here may be obtained from Bogen distributors, service agencies or directly from the factory. When ordering a part, specify the part number as listed, the model of the unit and give the series designation, which is a letter followed by numbers, printed on the chassis. For parts on circuit boards, also give the component board assembly number, which begins with "45."

When replacing transistors, use those made by the specified manufacturer. Transistors from other suppliers may not be satisfactory. Certain resistors must be Allen-Bradley products. These are designated by "AB" on the schematic diagram.

REPLACEMENT PARTS

Schem. Ref.	Part. No.	Description
		PC Board
—	**45-7062-01**	**PC board assembly**
C18	79-008-049	Capacitor, Electrolytic, 500 μF, 35V
C19, 22	79-504-032	Capacitor, tantalum, 2.2 μF, 15V
C31	79-112-001	Cap, electrolytic, 500 μF, 65V
C32	79-008-058	Cap, electro, 10 μF, 50V
C33	79-008-062	Cap, electro, 100 μF, 50V
C39	79-112-015	Cap, electro, 2500 μF, 50V
CR3-5	96-5333-01	Diode, 400 piv @ 1A
Q1-4, 7	96-5213-01	Transistor, 2N5089 or
	96-5346-01	Transistor, BC239C
Q5	96-5298-01	Transistor, SPS1910
Q6	96-5283-01	Transistor, MPSA55
Q8	96-5357-01	Transistor, 2SD-389 (P)
Q9	96-5356-01	Transistor, 2SB-512 (P)
R8	77-001-712	Control, 2 megohm
R27, 30	77-001-711	Control, 1 megohm
R42, 46	77-001-760	Control, 100 kohm
R47	77-001-710	Control, 200 kohm
R68, 69	76-107-096	Resistor, .82 ohm, 2W
		Chassis
C103	79-509-053	Capacitor, electrolytic, 1500 μF, 75V (C35)
	79-509-052	Cap, electro, 2000 μF, 75V (C60)
	79-509-051	Cap, electro, 3000 μF, 75V (C100)
CB101	94-0017-04	Circuit breaker, .93A hold (C35)
	94-0017-09	Cir. brkr., 1.65A hold (C60)
	94-0017-15	Cir. brkr., 2.5A hold (C100)
CB102	94-0014-07	Thermal breaker
CR101, 102	96-5241-01	Diode, 300 piv @ 3A
I101	94-0302-04	Pilot light assy, neon
Q101, 102	96-5385-01	Transistor, RCA 2N3055H (C35, 60)
	96-5397-01	Transistor, Solitron 2N3055 (C35, 60)
Q101-104	96-5397-01	Transistor, Solitron 2N3055 (C100)
R102, 103	76-116-003	Resistor, .27 ohm, 7W (C35, 60)
R102-105	76-116-003	Resistor, .27 ohm, 7W (C100)
SW101	81-003-050	Switch, ac, 3A (C35, 60)
	81-003-051	Switch, ac, 6A (C100)
T101	83-753-000	Transformer, power (C35)
	83-754-000	(C60)
	83-755-000	(C100)
T102	83-428-000	Transformer, output (C35)
	83-429-000	(C60)
	83-430-000	(C100)

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Your amplifier was carefully checked before leaving the factory. Inspect the shipping container and unit carefully for indication of improper handling. If the unit has been damaged, make an immediate claim to the distributor from whom it was purchased. If the amplifier was shipped to you, notify the transportation company without delay and place your claim.

POWER AND GROUNDING

The ac line cord has a three-prong plug which should be plugged into a three-wire grounded, 120 volt, 60 Hz outlet. Since it is important to ground the amplifier, where a three-wire outlet is not available use an adapter (e.g., Leviton No. 5017) and connect the grounding pigtail to the screw securing the wall plate. If the wall plate screw is not grounded, connect a wire from the GND terminal of the amplifier to a water or steam pipe.

AUXILIARY POWER

The auxiliary power receptacle on the rear chassis is a three-wire grounded outlet which can supply power to accessory equipment in the sound system. Be sure that the accessory component does not require more than 150 watts on the C35 and C60, and 300 watts on the C100. The power switch controls this receptacle and can be used to turn the auxiliary unit on and off. *

Associated equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded.

* **Caution**

Use the on-off switch on the phonograph for turning off a record player connected to the auxiliary receptacle. Do not use the amplifier power switch to stop the record player as this may cause flats to develop on the idler wheel of the phonograph.

INPUT CONNECTIONS

MICROPHONE: Two microphones may be connected to the amplifier simultaneously. Connect one to the MIC 1 receptacle and the second to the MIC 2 receptacle on the rear panel.

The microphones should be of the high-impedance ceramic, crystal, or dynamic type. Connect each microphone as shown in figure 1. The length of the interconnecting cable should be under 35 feet. For longer lines a suitable in-line transformer may be used with low impedance microphones.

MICROPHONE PRECEDENCE: Microphone precedence may be accomplished by connecting the circuit shown in figure 2. The equipment consists of a microphone, a Y-adapter (Switchcraft Part No. 330F1), a single-conductor shielded cable (20 feet maximum length) and a SPDT switch. If the microphone switch has an extra set of contacts for controlling an external circuit, such as on the Shure Model 450, the SPDT switch is not required.

Plug the Y-adapter into the AUX 1 or AUX 2 input jack on the rear of the amplifier. Connect the program source and precedence switch to the Y-adapter, as shown in the figure. Connect the microphone input to the MIC 1 or MIC 2 input jack.

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TECHNICAL SPECIFICATIONS

	C35	C60	C100
POWER OUTPUT:	35 watts	60 watts	100 watts
FREQUENCY RESPONSE:	100 to 10,000 Hz ±2dB		80 to 10,000 Hz ±2 dB
HUM AND NOISE:	MIC Input 60 dB below rated output AUX Input 70 dB below rated output		
SENSITIVITY:	MIC Input 3 mV AUX Input 150 mV		
OUTPUTS:	8, 16 ohms 25 V C.T. (18 ohms) 70 V (143 ohms)	8, 16 ohms 25 V C.T. (10.4 ohms) 70 V (83 ohms)	4, 16 ohms 25 V C.T. (6.25 ohms) 70 V (50 ohms)
OUTPUT CONNECTIONS:	2 quick-disconnect type sockets with plugs provided, in addition to screw-type terminals, tape/booster jack, and provisions for WMT-1		
INPUTS:	2 microphone (high impedance), 2 auxiliary (high-impedance, high level) 500/600 ohm line with WMT-1 accessory		
TONE CONTROL ACTION:	2-Microphone Volume, 1 AUX 1-2 Volume (Fader), Master Volume, Bass, and Treble		
CONTROLS:	Treble @ 10 kHz ± 11 dB Bass @ 100 Hz ± 11 dB		
POWER REQUIREMENTS:	120 VAC 60 Hz		
	96W	170W	250W
SEMICONDUCTORS:	All Silicon		
	11 Transistors 5 Diodes		13 Transistors 5 Diodes
DIMENSIONS:	14-5/8" W x 3-3/4" H x 13-3/4" D (37.1 x 9.5 x 34.9 cm)		
WEIGHT:	14 lbs. (6.3 kg)	16 lbs. (7.2 kg)	18 lbs. (8.1 kg)

PHONO: Connect a phonograph (with ceramic or crystal cartridge) to either the AUX 1 or AUX 2 jack, using a single-conductor shielded cable terminated in a standard RCA phono plug. It is recommended that a separate ground wire be connected between the phono player base and the amplifier GND terminal to minimize hum pick-up. This ground wire is not required when using the Bogen Model LPC-4A phono player top.

AUXILIARY: The AUX inputs may be used for sources other than a phonograph. Any signal source having a high-level (.15-3V) output may be connected to these inputs. This includes such Bogen equipment as the Model LPC-4A phono player top, and Model TP160B AM/FM tuner.

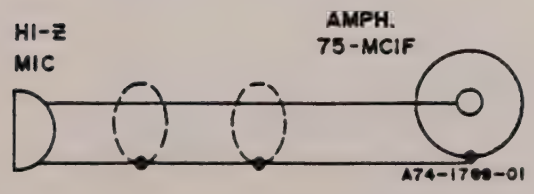


Figure 1 — Connecting Hi-Z Mic

OUTPUT CONNECTIONS

SPEAKERS: The amplifier may be used with most conventional speaker systems. For detailed information on the installation of multiple speaker systems, refer to the Speaker Installation Bulletin (No. 54-5001) included with this unit.

In permanent installations, where speakers will remain connected to the amplifier, connect the speaker system directly to the Speaker Output terminals on the rear of the amplifier. Connect one speaker lead to the COM terminal and the other to the terminal corresponding to the impedance of the speaker system. For balanced output lines, remove the link between COM and GND output terminals. If the line is shielded, connect the shield to GND. The 70V output is available only through the 3-pin connectors.

Caution

To minimize shock hazard, Class 1 wiring as defined in local building codes should be used for 70-volt outputs. All other outputs may use Class 2 wiring.

For frequently moved installations, connect the speaker to the speaker sockets on the rear panel. Two quick-disconnect plugs (Bogen Part No. 85-0147-01) are furnished with the amplifier to make connections to these sockets. Wiring of the speaker output plug is shown in figure 3.

When the speaker socket is used, connect the wired plug to either socket. Attach the impedance selector lead to the output terminal which corresponds to the speaker system impedance.

For 70-volt operation, it is only necessary to connect the wired plug to either quick-disconnect speaker socket, leaving the impedance selector disconnected. Note that the arrangement in figure 3 is for unbalanced speaker lines, with the link between COM and GND closed. For balanced lines, open the link between COM and GND.

CONNECTING AMPLIFIERS IN SERIES

Pairs of the same amplifier models can be connected in series to effectively double the power output into the same speaker system. See figure 4 for connection diagram. Be certain to remove the link between COM and GND of amplifier No. 2. Note that this arrangement is for unbalanced speaker lines. For balanced lines, remove the link between COM and GND of amplifier No. 1.

The input cabling must be arranged to parallel the inputs of the two amplifiers, and the volume and tone controls of both amplifiers must be at the same setting to assure that each amplifier will share the load equally.

TAPE RECORDING

To tape record the amplifier program, connect a patch cord from the TAPE/BOOSTER output jack to the input of the tape recorder. The patch cord should be single conductor, low-capacity shielded wire under 35 feet in length and terminated in a standard RCA phono plug.

ADDITIONAL BOOSTER AMPLIFIER

To drive a booster amplifier, connect a patch cord (see above) from the TAPE/BOOSTER output jack to the Hi-Z input of the booster amplifier.

OPERATION

POWER: The POWER switch turns the amplifier ON or OFF and controls power to equipment connected to the auxiliary power receptacle.

MIC 1, 2: The MIC controls are used to adjust the volume of the microphone inputs. Rotate the control clockwise (to the higher numbers) to increase volume. Set the control to the minimum position (0) when the microphone input is not used.

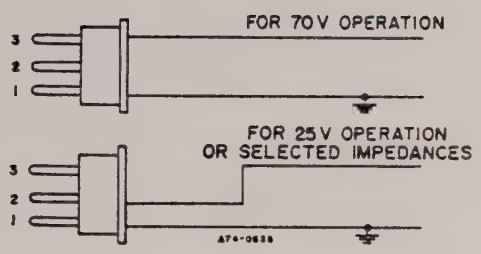


Figure 3 — Speaker Output Plug Wiring

AUX 1-AUX 2: This control selects either of the two auxiliary inputs, controls the volume of the selected input, and acts as a "fader" control, when both auxiliary inputs are connected.

Rotating this control counterclockwise, past the center position, selects the AUX 1 input and increases the AUX 1 volume. Rotating this control clockwise, past the center position, selects the AUX 2 input and increases the AUX 2 volume. By gradually and smoothly decreasing the level of one input and then increasing the other, you can "fade" from one input to the other.

MASTER: After the MIC and AUX input volume controls are used to mix the inputs as desired, rotate MASTER control to control the overall volume of the output signal. For most conditions the normal setting of the master control should be from 5 to 7.

BASS-TREBLE: The BASS and TREBLE controls are used to adjust the tonal balance of the amplifier output. The center position of these controls provides flat frequency response. Counterclockwise rotation of these controls reduces the bass or treble response, while clockwise rotation increases response.

The BASS control may also be used to remove low-frequency noise such as phono rumble or hum, while the TREBLE control can be used to reduce high-frequency noise, such as record scratch.

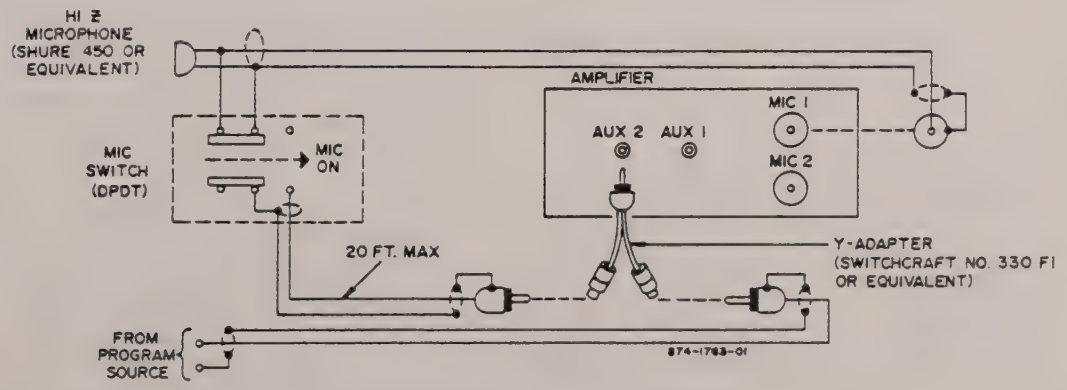


Figure 2 — Microphone Precedence Circuit

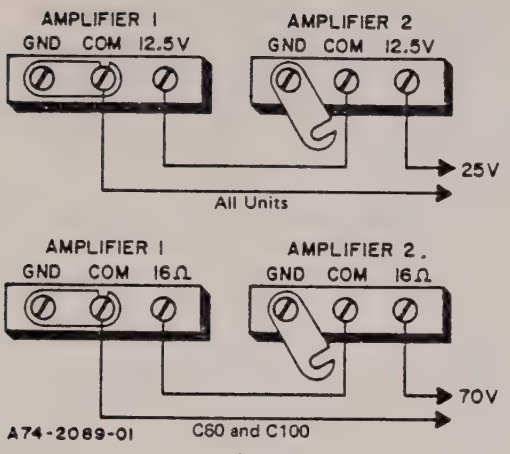


Figure 4 — Connecting Amplifiers in Series to Double Power Output

ACCESSORIES

Warning

Removing the amplifier cover presents an electrical shock hazard. Only a qualified technician should install this accessory.

WMT-1 LINE MATCHING TRANSFORMER: The Bogen WMT-1 line-matching transformer provides an impedance match between the amplifier and a 0 level, 500/600-ohm line. This may be a telephone line connected to the switchboard for internal paging or used with a wired music system. No soldering is required to connect the WMT-1 to the amplifier.

To connect the input from a balanced 500/600-ohm telephone line, remove the amplifier cover and mount the WMT-1 in the mounting holes provided on the chassis (see figure 5). Connect the input line to the three-screw terminal board on the WMT-1. Connect the phono plug on the WMT-1 cable to the AUX 1 or AUX 2 jack on the rear of the amplifier. If these jacks are being used for other sound inputs, the WMT-1 may be connected to one of the MIC inputs. In order to do this, the WMT-1 wiring must be modified as described in the instruction sheet supplied with the WMT-1.

To connect the amplifier output to a 500/600-ohm telephone line, remove the amplifier cover and mount the WMT-1 in the mounting holes provided in the chassis (see figure 5). Connect the 500/600-ohm line to the three-screw terminal board on the WMT-1. Connect the phono plug on the WMT-1 cable to the OUTPUT jack (next to the TAPE/BOOSTER jack) on the rear of the amplifier.

MODEL LPC-4A PHONO PLAYER TOP: The Model LPC-4A is a three-speed, ac operated phono player top designed for mounting on the amplifier. The phono player is furnished complete with all necessary mounting hardware, and only a screwdriver is required to install it on the amplifier. A tone arm housing a dual-stylus flip-over cartridge for standard or LP records is furnished with the unit.

RPK-34 RACK PANEL: The Bogen Model RPK-34 rack panel is designed to mount the amplifier in a standard 19-inch sound rack. The rack panel is finished in gray enamel.

CC12S CARRYING CASE AND SPEAKER: A Bogen Model CC12S carrying case with two speakers is available for portable systems. Each section of the case contains a high-efficiency 12-inch PM speaker and 25 feet of interconnecting cable with plug. Due to power handling limits, this accessory is recommended for use with C35 and C60 only.

LK-13 CONTROL GUARD LOCKING PLATE. The Bogen Model LK-13 is designed to prevent tampering with the controls of the amplifier. It comes complete with two sets of keys. The key cannot be removed when the lock is in open position.

MAINTENANCE

Caution

There are no user-replaceable parts within the unit. Have all internal servicing done by a qualified technician.

BOGEN SERVICE

We are interested in your Bogen equipment for as long as you have it. If trouble ever develops, do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, P.O. Box 500, Paramus, N.J. 07652.

When communicating with us, give the model and series designation of your unit. Describe the difficulty and include details on the electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If the trouble requires servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

When shipping your unit, pack the amplifier well, using the original shipping carton, or a similar container and filler material, to prevent damage in transit. Send the unit, fully insured and prepaid, via any responsible carrier. The unit will be promply repaired and returned to you.

CIRCUIT BREAKER

If the circuit breaker opens, the ac power lamp will go out and the amplifier will have no output, but there will be power at the AUX POWER receptacle at the rear panel. Set the ac power switch to off and momentarily depress the red button on the circuit breaker to reset it. Return the ac power switch to on. If the breaker trips again, do not attempt to reset it but have the trouble investigated by a qualified technician.

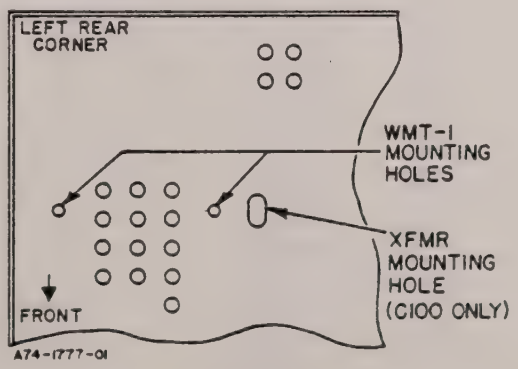
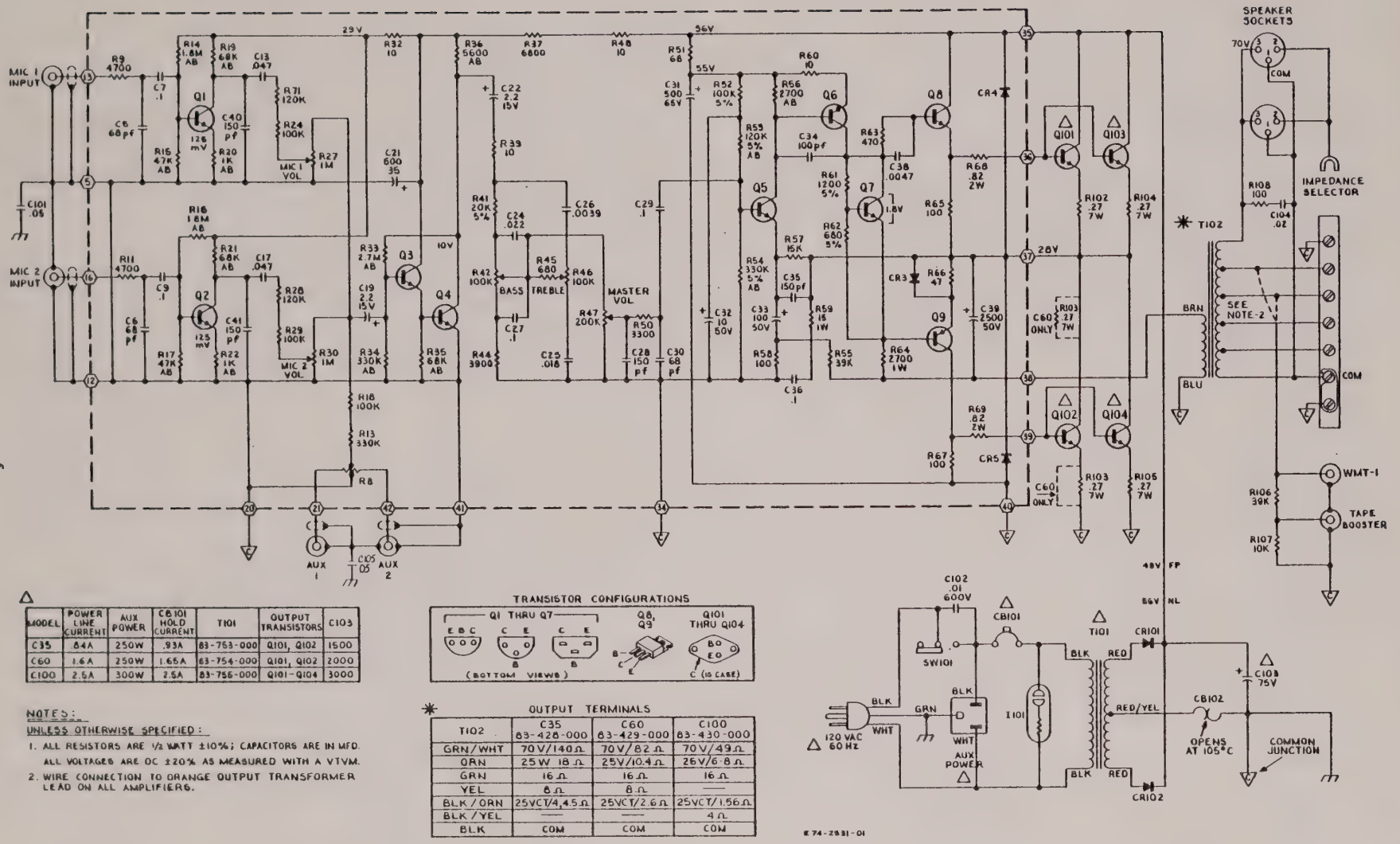


Figure 5 — Mounting Holes for WMT-1



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MODEL	POWER LINE CURRENT	AUX POWER	CB101 HOLD CURRENT	T101	OUTPUT TRANSISTORS	C103
C35	.84A	250W	.93A	83-753-000	Q101, Q102	1500
C60	1.6A	250W	1.65A	83-754-000	Q101, Q102	2000
C100	2.5A	300W	2.5A	83-756-000	Q101-Q104	3000

TRANSISTOR CONFIGURATIONS

NOTES:

UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS ARE ½ WATT ±10%; CAPACITORS ARE IN MFD. ALL VOLTAGES ARE DC ±20% AS MEASURED WITH A VTVM.
2. WIRE CONNECTION TO ORANGE OUTPUT TRANSFORMER LEAD ON ALL AMPLIFIERS.

✱ OUTPUT TERMINALS

T102	C35 83-428-000	C60 83-429-000	C100 83-430-000
GRN/WHT	70V/140Ω	70V/82Ω	70V/49Ω
ORN	25W 18Ω	25V/10.4Ω	25V/6.8Ω
GRN	16Ω	16Ω	16Ω
YEL	8Ω	8Ω	—
BLK/ORN	25VCT/4.45Ω	25VCT/2.6Ω	25VCT/1.56Ω
BLK/YEL	—	—	4Ω
BLK	COM	COM	COM

Figure 6 — Models C35, C60, and C100 Amplifiers, Schematic Diagram

THERMAL BREAKER

If the thermal breaker opens, there will be no audio output but the ac power lamp will remain on. Wait approximately two minutes for the breaker to reset. If the breaker resets and then opens again, investigate the cause of the temperature overload. This may be due to improper connections at the output terminals or to excessive environmental heat with inadequate ventilation. The thermal breaker will open when the temperature at the output transistor heat sink reaches 90° C. (194° F.) on Models C35 and C60, and 105° C. (221° F.) on Model C100.

Caution

All transistors are soldered to ensure maximum reliability. When soldering leads, use a heat sink (such as a small alligator clip) between the transistor and the source of heat.

PRINTED CIRCUIT BOARD

All components on top of the printed circuit board are easily accessible with the cover removed. The underside of the PC board can be exposed for repair or troubleshooting without disconnecting any wires. To do this, proceed as follows:

a) Remove all knobs and mounting nuts from the six control shafts.
b) Remove three Phillips-head screws securing rear of board to chassis brackets.
c) Push board toward rear of chassis until shafts clear holes in front panel. Front of board may now be tilted upward to expose underside connections.

REPLACING TRANSISTORS

When replacing the driver transistors, press a small screwdriver blade into the side of the U-clip heat sink to spread the jaws of the clip. Draw the clip and screwdriver off the metal tab on the driver transistor. Reverse the procedure to install the clip on the replacement transistor. Since the U-clip heat sink is a spring clip, avoid spreading the jaws too wide. Where driver transistors have a finned clip or heat sink, remove the heat sink from the original transistor and replace by pushing down onto new transistor. This is accomplished best by installing heat sink before soldering transistor into circuit board.

When replacing the output transistors, clean all foreign matter from the heat sink, insulator, and transistor. Brush a generous amount of silicon compound to completely cover both surfaces of the insulator (Part No. 16-9278-01). Place the insulator between the heat sink and the replacement transistor. Use the original transistor mounting hardware to mount the replacement transistor. Snap the transistor cover over the heat sink where used.

Most components are standard parts available through reputable parts suppliers. The parts listed here may be obtained from Bogen distributors, service agencies or directly from the factory. When ordering a part, specify the part number as listed, the model of the unit and give the series designation, which is a letter followed by numbers, printed on the chassis. For parts on circuit boards, also give the component board assembly number, which begins with "45."

When replacing transistors, use those made by the specified manufacturer. Transistors from other suppliers may not be satisfactory. Certain resistors must be Allen-Bradley products. These are designated by "AB" on the schematic diagram.

REPLACEMENT PARTS

Schem. Ref.	Part. No.	Description
		PC Board
—	**45-7062-01**	**PC board assembly**
C18	79-008-049	Capacitor, Electrolytic, 500 μF, 35V
C19, 22	79-504-032	Capacitor, tantalum, 2.2 μF, 15V
C31	79-112-001	Cap, electrolytic, 500 μF, 65V
C32	79-008-058	Cap, electro, 10 μF, 50V
C33	79-008-062	Cap, electro, 100 μF, 50V
C39	79-112-015	Cap, electro, 2500 μF, 50V
CR3-5	96-5333-01	Diode, 400 piv @ 1A
Q1-4, 7	96-5213-01	Transistor, 2N5089 or
	96-5346-01	Transistor, BC239C
Q5	96-5298-01	Transistor, SPS1910
Q6	96-5283-01	Transistor, MPSA55
Q8	96-5357-01	Transistor, 2SD-389 (P)
Q9	96-5356-01	Transistor, 2SB-512 (P)
R8	77-001-712	Control, 2 megohm
R27, 30	77-001-711	Control, 1 megohm
R42, 46	77-001-760	Control, 100 kohm
R47	77-001-710	Control, 200 kohm
R68, 69	76-107-096	Resistor, .82 ohm, 2W
		Chassis
C103	79-509-053	Capacitor, electrolytic, 1500 μF, 75V (C35)
	79-509-052	Cap, electro, 2000 μF, 75V (C60)
	79-509-051	Cap, electro, 3000 μF, 75V (C100)
CB101	94-0017-04	Circuit breaker, .93A hold (C35)
	94-0017-09	Cir. brkr., 1.65A hold (C60)
	94-0017-15	Cir. brkr., 2.5A hold (C100)
CB102	94-0014-07	Thermal breaker
CR101, 102	96-5241-01	Diode, 300 piv @ 3A
I101	94-0302-04	Pilot light assy, neon
Q101, 102	96-5385-01	Transistor, RCA 2N3055H (C35, 60)
	96-5397-01	Transistor, Solitron 2N3055 (C35, 60)
Q101-104	96-5397-01	Transistor, Solitron 2N3055 (C100)
R102, 103	76-116-003	Resistor, .27 ohm, 7W (C35, 60)
R102-105	76-116-003	Resistor, .27 ohm, 7W (C100)
SW101	81-003-050	Switch, ac, 3A (C35, 60)
	81-003-051	Switch, ac, 6A (C100)
T101	83-753-000	Transformer, power (C35)
	83-754-000	(C60)
	83-755-000	(C100)
T102	83-428-000	Transformer, output (C35)
	83-429-000	(C60)
	83-430-000	(C100)

ME-7965

BOGEN®
A DIVISION OF LEAR SIEGLER, INC.

SOLID STATE PUBLIC ADDRESS AMPLIFIERS

Models C35, C60, & C100

DESCRIPTION

The Bogen Challenger C series public address amplifiers are fully transistorized, rated at 35 watts in Model C35, 60 watts in Model C60, and 100 watts in Model C100. All units will accommodate two high-impedance microphones which may be connected simultaneously with individual volume controls provided for each microphone input. Two auxiliary inputs are provided for a tuner, tape recorder, or phonograph with a ceramic or crystal cartridge. A fader volume control selects and adjusts the level of the desired auxiliary input and permits a gradual changeover from one input to the other. A master volume control sets the overall level of the mixed inputs. Separate bass and treble controls permit adjustments for tonal balance.

Balanced or single-ended outputs are provided for standard speaker impedances and 25-volt center tapped and 70-volt constant voltage systems. Two quick-disconnect plugs provide rapid and convenient connections to speakers. Output jacks are provided for feeding a tape recorder or additional booster amplifier, and for connecting a WMT-1 accessory to match the output to a 500/600-ohm telephone line.

The amplifiers operate from a 120V, 60Hz source. Model C35 has a .93 ampere circuit breaker, C60 a 1.65 ampere, and C100 a 2.5 ampere circuit breaker. Power requirements for the individual models are shown in the Technical Specifications.

INSTALLATION

UNPACKING

Your amplifier was carefully checked before leaving the factory. Inspect the shipping container and unit carefully for indication of improper handling. If the unit has been damaged, make an immediate claim to the distributor from whom it was purchased. If the amplifier was shipped to you, notify the transportation company without delay and place your claim.

POWER AND GROUNDING

The ac line cord has a three-prong plug which should be plugged into a three-wire grounded, 120 volt, 60 Hz outlet. Since it is important to ground the amplifier, where a three-wire outlet is not available use an adapter (e.g., Leviton No. 5017) and connect the grounding pigtail to the screw securing the wall plate. If the wall plate screw is not grounded, connect a wire from the GND terminal of the amplifier to a water or steam pipe.

AUXILIARY POWER

The auxiliary power receptacle on the rear chassis is a three-wire grounded outlet which can supply power to accessory equipment in the sound system. Be sure that the accessory component does not require more than 150 watts on the C35 and C60, and 300 watts on the C100. The power switch controls this receptacle and can be used to turn the auxiliary unit on and off. *

Associated equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded.

*** Caution**

Use the on-off switch on the phonograph for turning off a record player connected to the auxiliary receptacle. Do not use the amplifier power switch to stop the record player as this may cause flats to develop on the idler wheel of the phonograph.

INPUT CONNECTIONS

MICROPHONE: Two microphones may be connected to the amplifier simultaneously. Connect one to the MIC 1 receptacle and the second to the MIC 2 receptacle on the rear panel.

The microphones should be of the high-impedance ceramic, crystal, or dynamic type. Connect each microphone as shown in figure 1. The length of the interconnecting cable should be under 35 feet. For longer lines a suitable in-line transformer may be used with low impedance microphones.

MICROPHONE PRECEDENCE: Microphone precedence may be accomplished by connecting the circuit shown in figure 2. The equipment consists of a microphone, a Y-adapter (Switchcraft Part No. 330F1), a single-conductor shielded cable (20 feet maximum length) and a SPDT switch. If the microphone switch has an extra set of contacts for controlling an external circuit, such as on the Shure Model 450, the SPDT switch is not required.

Plug the Y-adapter into the AUX 1 or AUX 2 input jack on the rear of the amplifier. Connect the program source and precedence switch to the Y-adapter, as shown in the figure. Connect the microphone input to the MIC 1 or MIC 2 input jack.

TECHNICAL SPECIFICATIONS

	C35	C60	C100
POWER OUTPUT:	35 watts	60 watts	100 watts
FREQUENCY RESPONSE:	100 to 10,000 Hz ±2dB		80 to 10,000 Hz ±2 dB
HUM AND NOISE:	MIC Input 60 dB below rated output AUX Input 70 dB below rated output		
SENSITIVITY:	MIC Input 3 mV AUX Input 150 mV		
OUTPUTS:	8, 16 ohms 25 V C.T. (18 ohms) 70 V (143 ohms)	8, 16 ohms 25 V C.T. (10.4 ohms) 70 V (83 ohms)	4, 16 ohms 25 V C.T. (6.25 ohms) 70 V (50 ohms)
OUTPUT CONNECTIONS:	2 quick-disconnect type sockets with plugs provided, in addition to screw-type terminals, tape/booster jack, and provisions for WMT-1		
INPUTS:	2 microphone (high impedance), 2 auxiliary (high-impedance, high level) 500/600 ohm line with WMT-1 accessory		
TONE CONTROL ACTION:	2-Microphone Volume, 1 AUX 1-2 Volume (Fader), Master Volume, Bass, and Treble		
CONTROLS:	Treble @ 10 kHz ± 11 dB Bass @ 100 Hz ± 11 dB		
POWER REQUIREMENTS:	120 VAC 60 Hz		
	96W	170W	250W
SEMICONDUCTORS:	All Silicon		
	11 Transistors 5 Diodes		13 Transistors 5 Diodes
DIMENSIONS:	14-5/8" W x 3-3/4" H x 13-3/4" D (37.1 x 9.5 x 34.9 cm)		
WEIGHT:	14 lbs. (6.3 kg)	16 lbs. (7.2 kg)	18 lbs. (8.1 kg)

PHONO: Connect a phonograph (with ceramic or crystal cartridge) to either the AUX 1 or AUX 2 jack, using a single-conductor shielded cable terminated in a standard RCA phono plug. It is recommended that a separate ground wire be connected between the phono player base and the amplifier GND terminal to minimize hum pick-up. This ground wire is not required when using the Bogen Model LPC-4A phono player top.

AUXILIARY: The AUX inputs may be used for sources other than a phonograph. Any signal source having a high-level (.15-3V) output may be connected to these inputs. This includes such Bogen equipment as the Model LPC-4A phono player top, and Model TP160B AM/FM tuner.

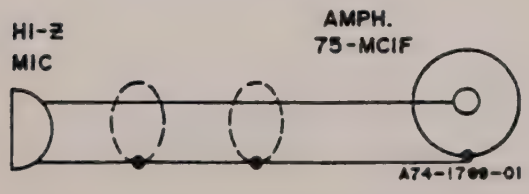

Figure 1 — Connecting Hi-Z Mic

OUTPUT CONNECTIONS

SPEAKERS: The amplifier may be used with most conventional speaker systems. For detailed information on the installation of multiple speaker systems, refer to the Speaker Installation Bulletin (No. 54-5001) included with this unit.

In permanent installations, where speakers will remain connected to the amplifier, connect the speaker system directly to the Speaker Output terminals on the rear of the amplifier. Connect one speaker lead to the COM terminal and the other to the terminal corresponding to the impedance of the speaker system. For balanced output lines, remove the link between COM and GND output terminals. If the line is shielded, connect the shield to GND. The 70V output is available only through the 3-pin connectors.

Caution

To minimize shock hazard, Class 1 wiring as defined in local building codes should be used for 70-volt outputs. All other outputs may use Class 2 wiring.

For frequently moved installations, connect the speaker to the speaker sockets on the rear panel. Two quick-disconnect plugs (Bogen Part No. 85-0147-01) are furnished with the amplifier to make connections to these sockets. Wiring of the speaker output plug is shown in figure 3.

When the speaker socket is used, connect the wired plug to either socket. Attach the impedance selector lead to the output terminal which corresponds to the speaker system impedance.

For 70-volt operation, it is only necessary to connect the wired plug to either quick-disconnect speaker socket, leaving the impedance selector disconnected. Note that the arrangement in figure 3 is for unbalanced speaker lines, with the link between COM and GND closed. For balanced lines, open the link between COM and GND.

CONNECTING AMPLIFIERS IN SERIES

Pairs of the same amplifier models can be connected in series to effectively double the power output into the same speaker system. See figure 4 for connection diagram. Be certain to remove the link between COM and GND of amplifier No. 2. Note that this arrangement is for unbalanced speaker lines. For balanced lines, remove the link between COM and GND of amplifier No. 1.

The input cabling must be arranged to parallel the inputs of the two amplifiers, and the volume and tone controls of both amplifiers must be at the same setting to assure that each amplifier will share the load equally.

TAPE RECORDING

To tape record the amplifier program, connect a patch cord from the TAPE/BOOSTER output jack to the input of the tape recorder. The patch cord should be single conductor, low-capacity shielded wire under 35 feet in length and terminated in a standard RCA phono plug.

ADDITIONAL BOOSTER AMPLIFIER

To drive a booster amplifier, connect a patch cord (see above) from the TAPE/BOOSTER output jack to the Hi-Z input of the booster amplifier.

OPERATION

POWER: The POWER switch turns the amplifier ON or OFF and controls power to equipment connected to the auxiliary power receptacle.

MIC 1, 2: The MIC controls are used to adjust the volume of the microphone inputs. Rotate the control clockwise (to the higher numbers) to increase volume. Set the control to the minimum position (0) when the microphone input is not used.

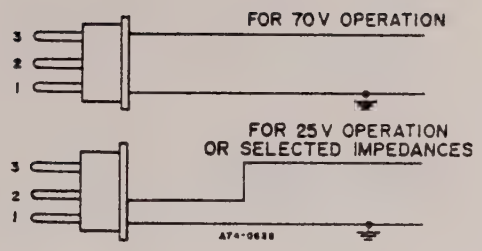

Figure 3 — Speaker Output Plug Wiring

AUX 1-AUX 2: This control selects either of the two auxiliary inputs, controls the volume of the selected input, and acts as a "fader" control, when both auxiliary inputs are connected.

Rotating this control counterclockwise, past the center position, selects the AUX 1 input and increases the AUX 1 volume. Rotating this control clockwise, past the center position, selects the AUX 2 input and increases the AUX 2 volume. By gradually and smoothly decreasing the level of one input and then increasing the other, you can "fade" from one input to the other.

MASTER: After the MIC and AUX input volume controls are used to mix the inputs as desired, rotate MASTER control to control the overall volume of the output signal. For most conditions the normal setting of the master control should be from 5 to 7.

BASS-TREBLE: The BASS and TREBLE controls are used to adjust the tonal balance of the amplifier output. The center position of these controls provides flat frequency response. Counterclockwise rotation of these controls reduces the bass or treble response, while clockwise rotation increases response.

The BASS control may also be used to remove low-frequency noise such as phono rumble or hum, while the TREBLE control can be used to reduce high-frequency noise, such as record scratch.

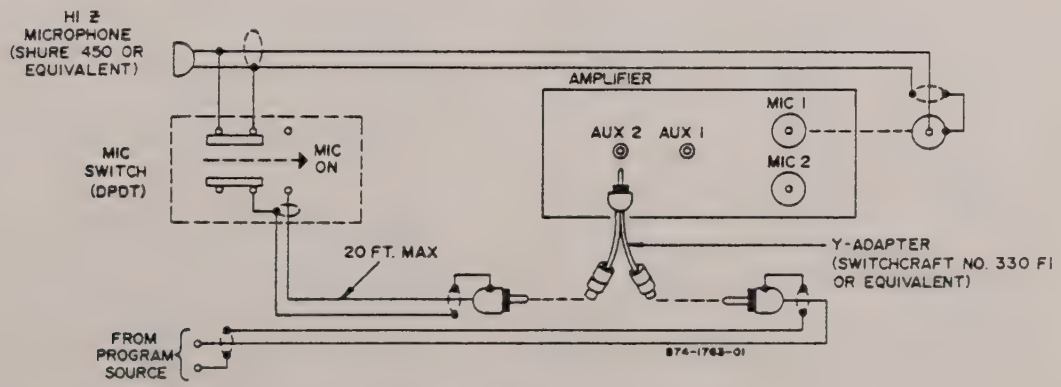

Figure 2 — Microphone Precedence Circuit

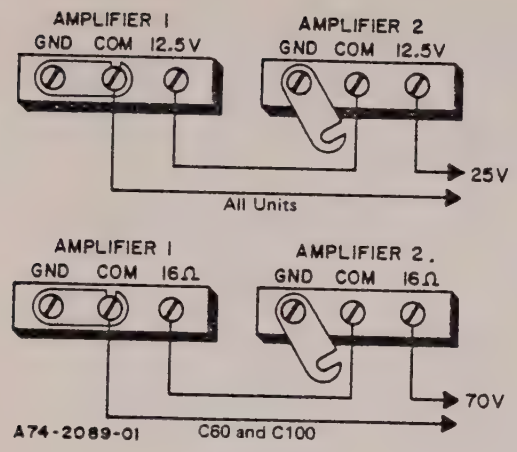

Figure 4 — Connecting Amplifiers in Series to Double Power Output

ACCESSORIES

Warning

Removing the amplifier cover presents an electrical shock hazard. Only a qualified technician should install this accessory.

WMT-1 LINE MATCHING TRANSFORMER: The Bogen WMT-1 line-matching transformer provides an impedance match between the amplifier and a 0 level, 500/600-ohm line. This may be a telephone line connected to the switchboard for internal paging or used with a wired music system. No soldering is required to connect the WMT-1 to the amplifier.

To connect the input from a balanced 500/600-ohm telephone line, remove the amplifier cover and mount the WMT-1 in the mounting holes provided on the chassis (see figure 5). Connect the input line to the three-screw terminal board on the WMT-1. Connect the phono plug on the WMT-1 cable to the AUX 1 or AUX 2 jack on the rear of the amplifier. If these jacks are being used for other sound inputs, the WMT-1 may be connected to one of the MIC inputs. In order to do this, the WMT-1 wiring must be modified as described in the instruction sheet supplied with the WMT-1.

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MAINTENANCE

Caution

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CIRCUIT BREAKER

If the circuit breaker opens, the ac power lamp will go out and the amplifier will have no output, but there will be power at the AUX POWER receptacle at the rear panel. Set the ac power switch to off and momentarily depress the red button on the circuit breaker to reset it. Return the ac power switch to on. If the breaker trips again, do not attempt to reset it but have the trouble investigated by a qualified technician.

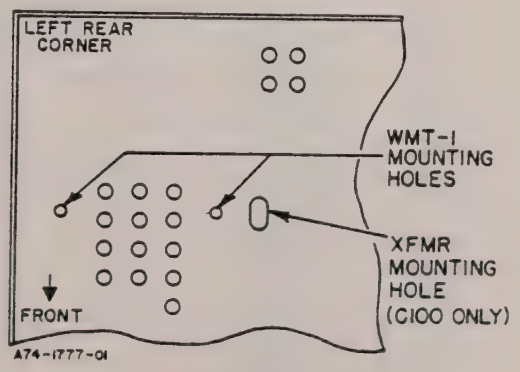
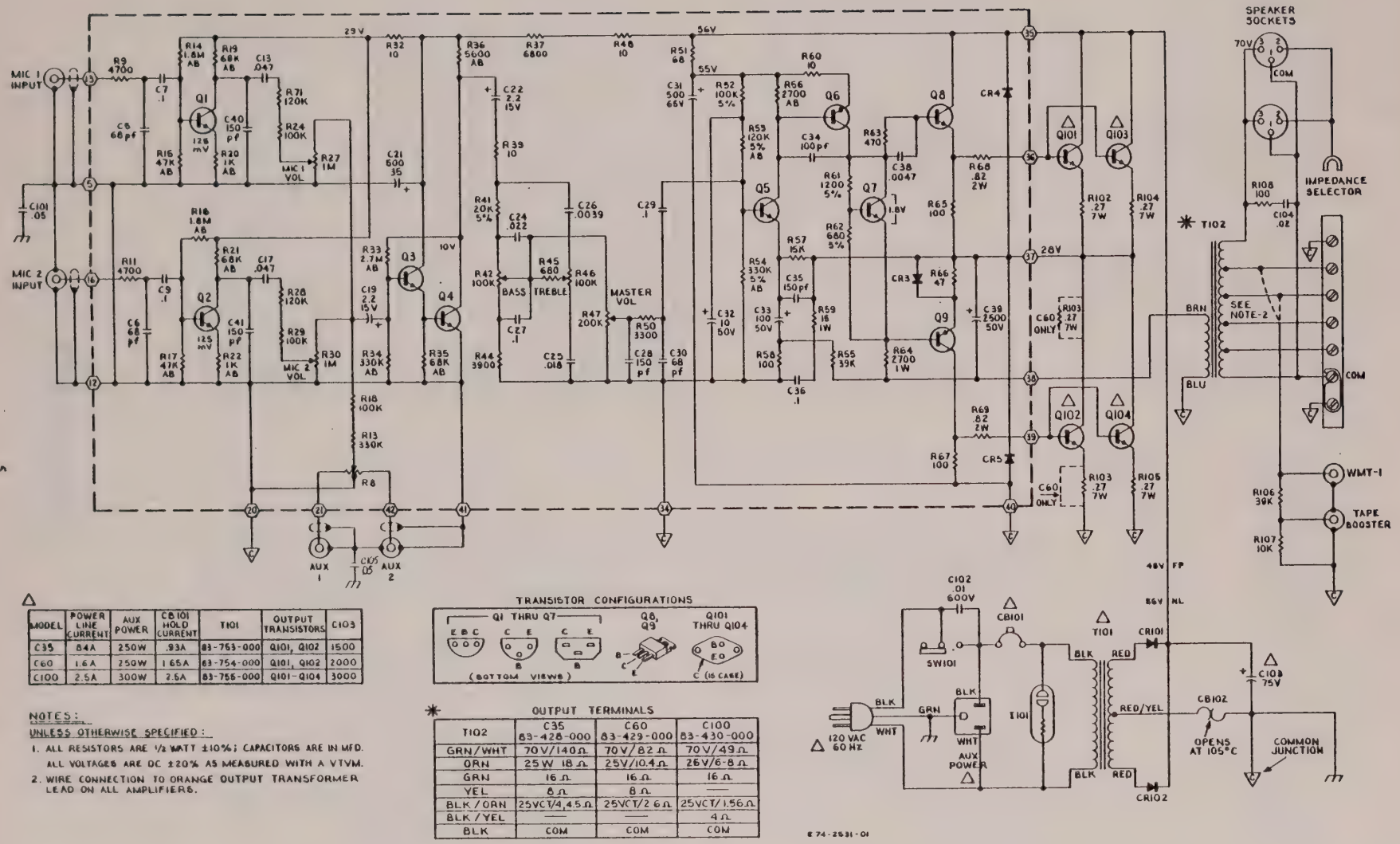


Figure 5 — Mounting Holes for WMT-1



MODEL	POWER LINE CURRENT	AUX POWER	CB101 HOLD CURRENT	T101	OUTPUT TRANSISTORS	C103
C35	8.4A	250W	9.3A	83-763-000	Q101, Q102	1500
C60	1.6A	250W	1.65A	83-754-000	Q101, Q102	2000
C100	2.5A	300W	2.6A	83-756-000	Q101-Q104	3000

TRANSISTOR CONFIGURATIONS

Q1 THRU Q7 (BOTTOM VIEWS)

Q8, Q9

Q101 THRU Q104

NOTES:

UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS ARE 1/2 WATT ±10%; CAPACITORS ARE IN MFD. ALL VOLTAGES ARE DC ±20% AS MEASURED WITH A VTVM.
2. WIRE CONNECTION TO ORANGE OUTPUT TRANSFORMER LEAD ON ALL AMPLIFIERS.

OUTPUT TERMINALS

T102	C35 83-428-000	C60 83-429-000	C100 83-430-000
GRN/WHT	70V/140Ω	70V/82Ω	70V/49Ω
ORN	25W 18Ω	25V/10.4Ω	26V/6-8Ω
GRN	16Ω	16Ω	16Ω
YEL	8Ω	8Ω	—
BLK/ORN	25VCT/4,4.5Ω	25VCT/2.6Ω	25VCT/1.56Ω
BLK/YEL	—	—	4Ω
BLK	COM	COM	COM

Figure 6 — Models C35, C60, and C100 Amplifiers, Schematic Diagram

THERMAL BREAKER

If the thermal breaker opens, there will be no audio output but the ac power lamp will remain on. Wait approximately two minutes for the breaker to reset. If the breaker resets and then opens again, investigate the cause of the temperature overload. This may be due to improper connections at the output terminals or to excessive environmental heat with inadequate ventilation. The thermal breaker will open when the temperature at the output transistor heat sink reaches 90° C. (194° F.) on Models C35 and C60, and 105° C. (221° F.) on Model C100.

Caution

All transistors are soldered to ensure maximum reliability. When soldering leads, use a heat sink (such as a small alligator clip) between the transistor and the source of heat.

PRINTED CIRCUIT BOARD

All components on top of the printed circuit board are easily accessible with the cover removed. The underside of the PC board can be exposed for repair or troubleshooting without disconnecting any wires. To do this, proceed as follows:

a) Remove all knobs and mounting nuts from the six control shafts.
b) Remove three Phillips-head screws securing rear of board to chassis brackets.
c) Push board toward rear of chassis until shafts clear holes in front panel. Front of board may now be tilted upward to expose underside connections.

REPLACING TRANSISTORS

When replacing the driver transistors, press a small screwdriver blade into the side of the U-clip heat sink to spread the jaws of the clip. Draw the clip and screwdriver off the metal tab on the driver transistor. Reverse the procedure to install the clip on the replacement transistor. Since the U-clip heat sink is a spring clip, avoid spreading the jaws too wide. Where driver transistors have a finned clip or heat sink, remove the heat sink from the original transistor and replace by pushing down onto new transistor. This is accomplished best by installing heat sink before soldering transistor into circuit board.

When replacing the output transistors, clean all foreign matter from the heat sink, insulator, and transistor. Brush a generous amount of silicon compound to completely cover both surfaces of the insulator (Part No. 16-9278-01). Place the insulator between the heat sink and the replacement transistor. Use the original transistor mounting hardware to mount the replacement transistor. Snap the transistor cover over the heat sink where used.

Most components are standard parts available through reputable parts suppliers. The parts listed here may be obtained from Bogen distributors, service agencies or directly from the factory. When ordering a part, specify the part number as listed, the model of the unit and give the series designation, which is a letter followed by numbers, printed on the chassis. For parts on circuit boards, also give the component board assembly number, which begins with "45."

When replacing transistors, use those made by the specified manufacturer. Transistors from other suppliers may not be satisfactory. Certain resistors must be Allen-Bradley products. These are designated by "AB" on the schematic diagram.

REPLACEMENT PARTS

Schem. Ref.	Part. No.	Description
		PC Board
—	**45-7062-01**	**PC board assembly**
C18	79-008-049	Capacitor, Electrolytic, 500 μF, 35V
C19, 22	79-504-032	Capacitor, tantalum, 2.2 μF, 15V
C31	79-112-001	Cap, electrolytic, 500 μF, 65V
C32	79-008-058	Cap, electro, 10 μF, 50V
C33	79-008-062	Cap, electro, 100 μF, 50V
C39	79-112-015	Cap, electro, 2500 μF, 50V
CR3-5	96-5333-01	Diode, 400 piv @ 1A
Q1-4, 7	96-5213-01	Transistor, 2N5089 or
	96-5346-01	Transistor, BC239C
Q5	96-5298-01	Transistor, SPS1910
Q6	96-5283-01	Transistor, MPSA55
Q8	96-5357-01	Transistor, 2SD-389 (P)
Q9	96-5356-01	Transistor, 2SB-512 (P)
R8	77-001-712	Control, 2 megohm
R27, 30	77-001-711	Control, 1 megohm
R42, 46	77-001-760	Control, 100 kohm
R47	77-001-710	Control, 200 kohm
R68, 69	76-107-096	Resistor, .82 ohm, 2W
		Chassis
C103	79-509-053	Capacitor, electrolytic, 1500 μF, 75V (C35)
	79-509-052	Cap, electro, 2000 μF, 75V (C60)
	79-509-051	Cap, electro, 3000 μF, 75V (C100)
CB101	94-0017-04	Circuit breaker, .93A hold (C35)
	94-0017-09	Cir. brkr., 1.65A hold (C60)
	94-0017-15	Cir. brkr., 2.5A hold (C100)
CB102	94-0014-07	Thermal breaker
CR101, 102	96-5241-01	Diode, 300 piv @ 3A
I101	94-0302-04	Pilot light assy, neon
Q101, 102	96-5385-01	Transistor, RCA 2N3055H (C35, 60)
	96-5397-01	Transistor, Solitron 2N3055 (C35, 60)
Q101-104	96-5397-01	Transistor, Solitron 2N3055 (C100)
R102, 103	76-116-003	Resistor, .27 ohm, 7W (C35, 60)
R102-105	76-116-003	Resistor, .27 ohm, 7W (C100)
SW101	81-003-050	Switch, ac, 3A (C35, 60)
	81-003-051	Switch, ac, 6A (C100)
T101	83-753-000	Transformer, power (C35)
	83-754-000	(C60)
	83-755-000	(C100)
T102	83-428-000	Transformer, output (C35)
	83-429-000	(C60)
	83-430-000	(C100)

ME-7965 -

BOGEN®
A DIVISION OF LEAR SIEGLER, INC.

SOLID STATE PUBLIC ADDRESS AMPLIFIERS

Models C35, C60, & C100

DESCRIPTION

The Bogen Challenger C series public address amplifiers are fully transistorized, rated at 35 watts in Model C35, 60 watts in Model C60, and 100 watts in Model C100. All units will accommodate two high-impedance microphones which may be connected simultaneously with individual volume controls provided for each microphone input. Two auxiliary inputs are provided for a tuner, tape recorder, or phonograph with a ceramic or crystal cartridge. A fader volume control selects and adjusts the level of the desired auxiliary input and permits a gradual changeover from one input to the other. A master volume control sets the overall level of the mixed inputs. Separate bass and treble controls permit adjustments for tonal balance.

Balanced or single-ended outputs are provided for standard speaker impedances and 25-volt center tapped and 70-volt constant voltage systems. Two quick-disconnect plugs provide rapid and convenient connections to speakers. Output jacks are provided for feeding a tape recorder or additional booster amplifier, and for connecting a WMT-1 accessory to match the output to a 500/600-ohm telephone line.

The amplifiers operate from a 120V, 60Hz source. Model C35 has a .93 ampere circuit breaker, C60 a 1.65 ampere, and C100 a 2.5 ampere circuit breaker. Power requirements for the individual models are shown in the Technical Specifications.

INSTALLATION

UNPACKING

Your amplifier was carefully checked before leaving the factory. Inspect the shipping container and unit carefully for indication of improper handling. If the unit has been damaged, make an immediate claim to the distributor from whom it was purchased. If the amplifier was shipped to you, notify the transportation company without delay and place your claim.

POWER AND GROUNDING

The ac line cord has a three-prong plug which should be plugged into a three-wire grounded, 120 volt, 60 Hz outlet. Since it is important to ground the amplifier, where a three-wire outlet is not available use an adapter (e.g., Leviton No. 5017) and connect the grounding pigtail to the screw securing the wall plate. If the wall plate screw is not grounded, connect a wire from the GND terminal of the amplifier to a water or steam pipe.

AUXILIARY POWER

The auxiliary power receptacle on the rear chassis is a three-wire grounded outlet which can supply power to accessory equipment in the sound system. Be sure that the accessory component does not require more than 150 watts on the C35 and C60, and 300 watts on the C100. The power switch controls this receptacle and can be used to turn the auxiliary unit on and off. *

Associated equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded.

*** Caution**

Use the on-off switch on the phonograph for turning off a record player connected to the auxiliary receptacle. Do not use the amplifier power switch to stop the record player as this may cause flats to develop on the idler wheel of the phonograph.

INPUT CONNECTIONS

MICROPHONE: Two microphones may be connected to the amplifier simultaneously. Connect one to the MIC 1 receptacle and the second to the MIC 2 receptacle on the rear panel.

The microphones should be of the high-impedance ceramic, crystal, or dynamic type. Connect each microphone as shown in figure 1. The length of the interconnecting cable should be under 35 feet. For longer lines a suitable in-line transformer may be used with low impedance microphones.

MICROPHONE PRECEDENCE: Microphone precedence may be accomplished by connecting the circuit shown in figure 2. The equipment consists of a microphone, a Y-adapter (Switchcraft Part No. 330F1), a single-conductor shielded cable (20 feet maximum length) and a SPDT switch. If the microphone switch has an extra set of contacts for controlling an external circuit, such as on the Shure Model 450, the SPDT switch is not required.

Plug the Y-adapter into the AUX 1 or AUX 2 input jack on the rear of the amplifier. Connect the program source and precedence switch to the Y-adapter, as shown in the figure. Connect the microphone input to the MIC 1 or MIC 2 input jack.

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54-5830-11

TECHNICAL SPECIFICATIONS

	C35	C60	C100
POWER OUTPUT:	35 watts	60 watts	100 watts
FREQUENCY RESPONSE:	100 to 10,000 Hz ±2dB		80 to 10,000 Hz ±2 dB
HUM AND NOISE:	MIC Input 60 dB below rated output AUX Input 70 dB below rated output		
SENSITIVITY:	MIC Input 3 mV AUX Input 150 mV		
OUTPUTS:	8, 16 ohms 25 V C.T. (18 ohms) 70 V (143 ohms)	8, 16 ohms 25 V C.T. (10.4 ohms) 70 V (83 ohms)	4, 16 ohms 25 V C.T. (6.25 ohms) 70 V (50 ohms)
OUTPUT CONNECTIONS:	2 quick-disconnect type sockets with plugs provided, in addition to screw-type terminals, tape/booster jack, and provisions for WMT-1		
INPUTS:	2 microphone (high impedance), 2 auxiliary (high-impedance, high level) 500/600 ohm line with WMT-1 accessory		
TONE CONTROL ACTION:	2-Microphone Volume, 1 AUX 1-2 Volume (Fader), Master Volume, Bass, and Treble		
CONTROLS:	Treble @ 10 kHz ± 11 dB Bass @ 100 Hz ± 11 dB		
POWER REQUIREMENTS:	120 VAC 60 Hz		
	96W	170W	250W
SEMICONDUCTORS:	All Silicon		
	11 Transistors 5 Diodes		13 Transistors 5 Diodes
DIMENSIONS:	14-5/8" W x 3-3/4" H x 13-3/4" D (37.1 x 9.5 x 34.9 cm)		
WEIGHT:	14 lbs. (6.3 kg)	16 lbs. (7.2 kg)	18 lbs. (8.1 kg)

PHONO: Connect a phonograph (with ceramic or crystal cartridge) to either the AUX 1 or AUX 2 jack, using a single-conductor shielded cable terminated in a standard RCA phono plug. It is recommended that a separate ground wire be connected between the phono player base and the amplifier GND terminal to minimize hum pick-up. This ground wire is not required when using the Bogen Model LPC-4A phono player top.

AUXILIARY: The AUX inputs may be used for sources other than a phonograph. Any signal source having a high-level (.15-3V) output may be connected to these inputs. This includes such Bogen equipment as the Model LPC-4A phono player top, and Model TP160B AM/FM tuner.

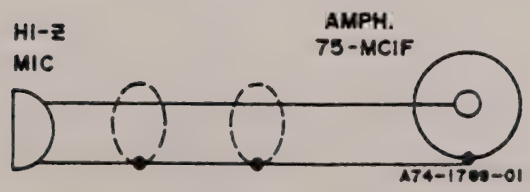


Figure 1 — Connecting Hi-Z Mic

OUTPUT CONNECTIONS

SPEAKERS: The amplifier may be used with most conventional speaker systems. For detailed information on the installation of multiple speaker systems, refer to the Speaker Installation Bulletin (No. 54-5001) included with this unit.

In permanent installations, where speakers will remain connected to the amplifier, connect the speaker system directly to the Speaker Output terminals on the rear of the amplifier. Connect one speaker lead to the COM terminal and the other to the terminal corresponding to the impedance of the speaker system. For balanced output lines, remove the link between COM and GND output terminals. If the line is shielded, connect the shield to GND. The 70V output is available only through the 3-pin connectors.

Caution

To minimize shock hazard, Class 1 wiring as defined in local building codes should be used for 70-volt outputs. All other outputs may use Class 2 wiring.

For frequently moved installations, connect the speaker to the speaker sockets on the rear panel. Two quick-disconnect plugs (Bogen Part No. 85-0147-01) are furnished with the amplifier to make connections to these sockets. Wiring of the speaker output plug is shown in figure 3.

When the speaker socket is used, connect the wired plug to either socket. Attach the impedance selector lead to the output terminal which corresponds to the speaker system impedance.

For 70-volt operation, it is only necessary to connect the wired plug to either quick-disconnect speaker socket, leaving the impedance selector disconnected. Note that the arrangement in figure 3 is for unbalanced speaker lines, with the link between COM and GND closed. For balanced lines, open the link between COM and GND.

CONNECTING AMPLIFIERS IN SERIES

Pairs of the same amplifier models can be connected in series to effectively double the power output into the same speaker system. See figure 4 for connection diagram. Be certain to remove the link between COM and GND of amplifier No. 2. Note that this arrangement is for unbalanced speaker lines. For balanced lines, remove the link between COM and GND of amplifier No. 1.

The input cabling must be arranged to parallel the inputs of the two amplifiers, and the volume and tone controls of both amplifiers must be at the same setting to assure that each amplifier will share the load equally.

TAPE RECORDING

To tape record the amplifier program, connect a patch cord from the TAPE/BOOSTER output jack to the input of the tape recorder. The patch cord should be single conductor, low-capacity shielded wire under 35 feet in length and terminated in a standard RCA phono plug.

ADDITIONAL BOOSTER AMPLIFIER

To drive a booster amplifier, connect a patch cord (see above) from the TAPE/BOOSTER output jack to the Hi-Z input of the booster amplifier.

OPERATION

POWER: The POWER switch turns the amplifier ON or OFF and controls power to equipment connected to the auxiliary power receptacle.

MIC 1, 2: The MIC controls are used to adjust the volume of the microphone inputs. Rotate the control clockwise (to the higher numbers) to increase volume. Set the control to the minimum position (0) when the microphone input is not used.

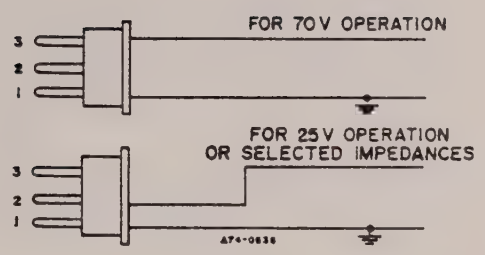


Figure 3 — Speaker Output Plug Wiring

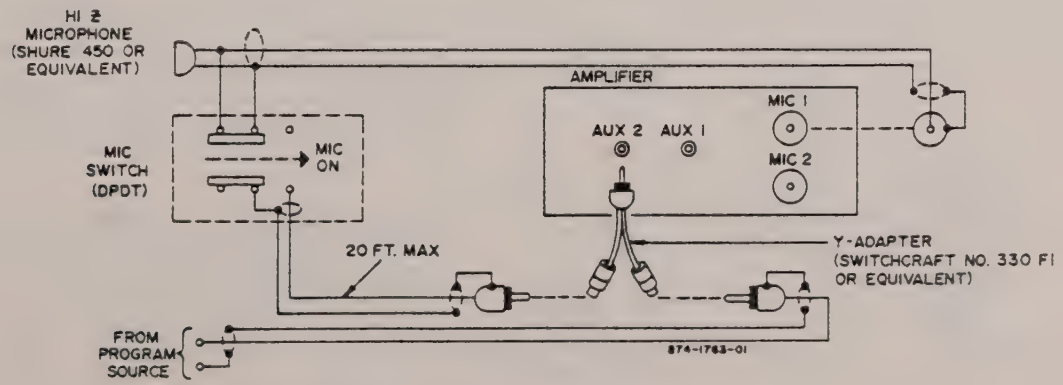
AUX 1-AUX 2: This control selects either of the two auxiliary inputs, controls the volume of the selected input, and acts as a "fader" control, when both auxiliary inputs are connected.

Rotating this control counterclockwise, past the center position, selects the AUX 1 input and increases the AUX 1 volume. Rotating this control clockwise, past the center position, selects the AUX 2 input and increases the AUX 2 volume. By gradually and smoothly decreasing the level of one input and then increasing the other, you can "fade" from one input to the other.

MASTER: After the MIC and AUX input volume controls are used to mix the inputs as desired, rotate MASTER control to control the overall volume of the output signal. For most conditions the normal setting of the master control should be from 5 to 7.

BASS-TREBLE: The BASS and TREBLE controls are used to adjust the tonal balance of the amplifier output. The center position of these controls provides flat frequency response. Counterclockwise rotation of these controls reduces the bass or treble response, while clockwise rotation increases response.

The BASS control may also be used to remove low-frequency noise such as phono rumble or hum, while the TREBLE control can be used to reduce high-frequency noise, such as record scratch.



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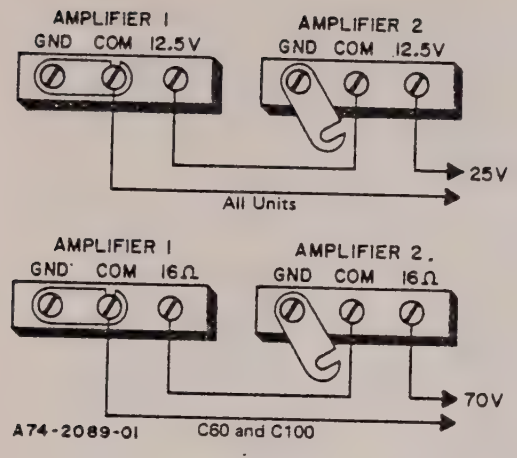

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CIRCUIT BREAKER

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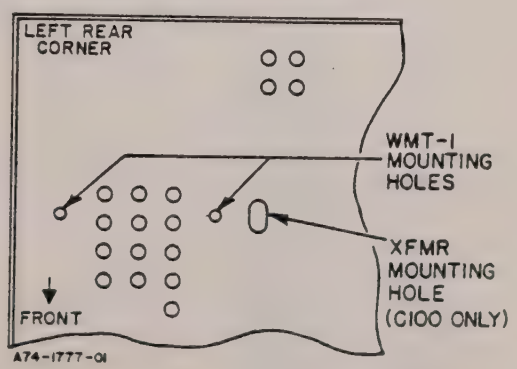
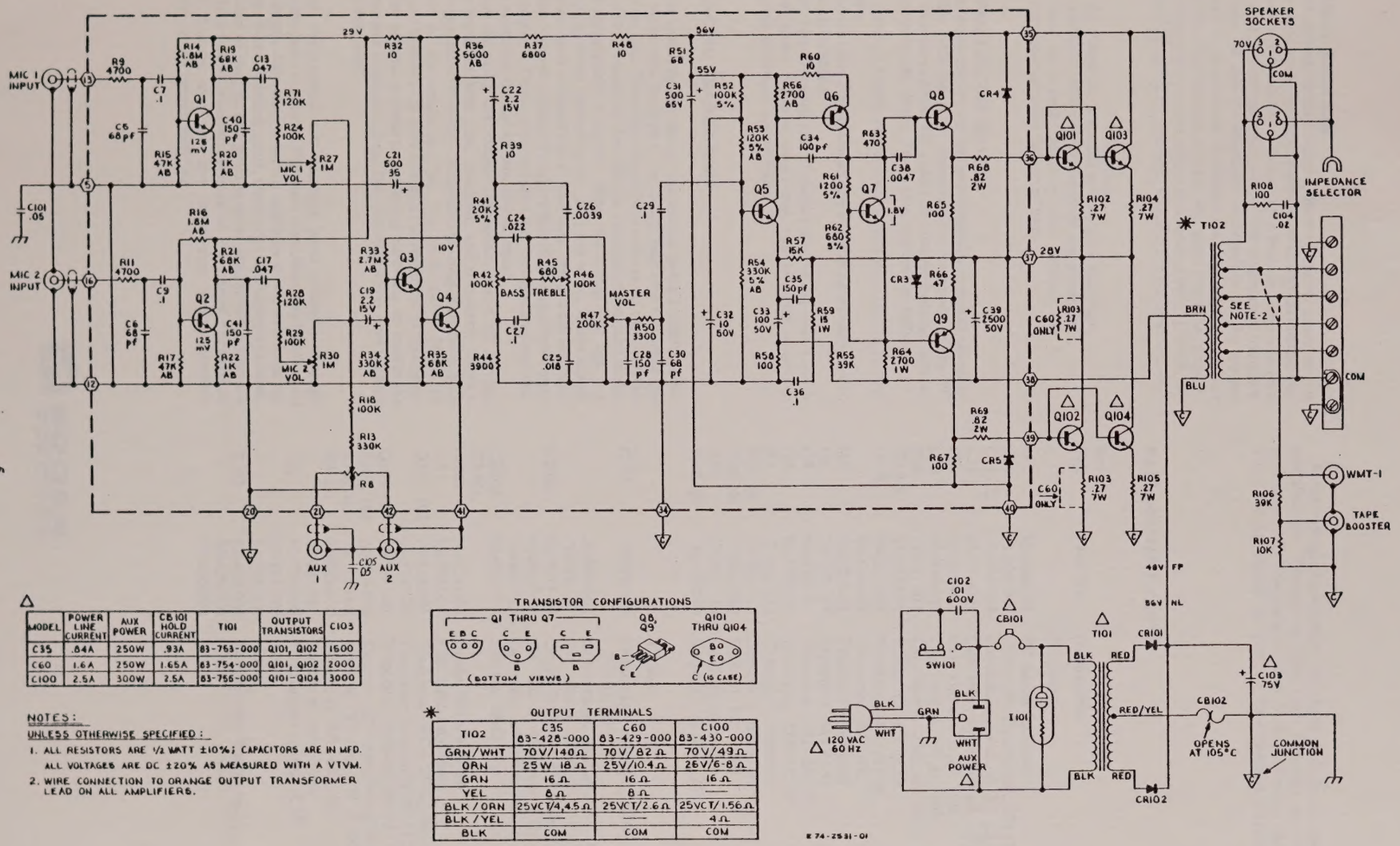


Figure 5 — Mounting Holes for WMT-1



△

MODEL	POWER LINE CURRENT	AUX POWER	CB101 HOLD CURRENT	T101	OUTPUT TRANSISTORS	C103
C35	.84A	250W	.93A	83-763-000	Q101, Q102	1500
C60	1.6A	250W	1.65A	83-754-000	Q101, Q102	2000
C100	2.5A	300W	2.5A	83-755-000	Q101-Q104	3000

TRANSISTOR CONFIGURATIONS

✷ OUTPUT TERMINALS

T102	C35 83-428-000	C60 83-429-000	C100 83-430-000
GRN/WHT	70V/140Ω	70V/82Ω	70V/49Ω
ORN	25W 18Ω	25V/10.4Ω	25V/6-8Ω
GRN	16Ω	16Ω	16Ω
YEL	8Ω	8Ω	—
BLK/ORN	25VCT/4.45Ω	25VCT/2.6Ω	25VCT/1.56Ω
BLK/YEL	—	—	4Ω
BLK	COM	COM	COM

NOTES:

UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS ARE 1/2 WATT ±10%; CAPACITORS ARE IN MFD. ALL VOLTAGES ARE DC ±20% AS MEASURED WITH A VTVM.
2. WIRE CONNECTION TO ORANGE OUTPUT TRANSFORMER LEAD ON ALL AMPLIFIERS.

Figure 6 — Models C35, C60, and C100 Amplifiers, Schematic Diagram

THERMAL BREAKER

If the thermal breaker opens, there will be no audio output but the ac power lamp will remain on. Wait approximately two minutes for the breaker to reset. If the breaker resets and then opens again, investigate the cause of the temperature overload. This may be due to improper connections at the output terminals or to excessive environmental heat with inadequate ventilation. The thermal breaker will open when the temperature at the output transistor heat sink reaches 90° C. (194° F.) on Models C35 and C60, and 105° C. (221° F.) on Model C100.

Caution

All transistors are soldered to ensure maximum reliability. When soldering leads, use a heat sink (such as a small alligator clip) between the transistor and the source of heat.

PRINTED CIRCUIT BOARD

All components on top of the printed circuit board are easily accessible with the cover removed. The underside of the PC board can be exposed for repair or troubleshooting without disconnecting any wires. To do this, proceed as follows:

a) Remove all knobs and mounting nuts from the six control shafts.
b) Remove three Phillips-head screws securing rear of board to chassis brackets.
c) Push board toward rear of chassis until shafts clear holes in front panel. Front of board may now be tilted upward to expose underside connections.

REPLACING TRANSISTORS

When replacing the driver transistors, press a small screwdriver blade into the side of the U-clip heat sink to spread the jaws of the clip. Draw the clip and screwdriver off the metal tab on the driver transistor. Reverse the procedure to install the clip on the replacement transistor. Since the U-clip heat sink is a spring clip, avoid spreading the jaws too wide. Where driver transistors have a finned clip or heat sink, remove the heat sink from the original transistor and replace by pushing down onto new transistor. This is accomplished best by installing heat sink before soldering transistor into circuit board.

When replacing the output transistors, clean all foreign matter from the heat sink, insulator, and transistor. Brush a generous amount of silicon compound to completely cover both surfaces of the insulator (Part No. 16-9278-01). Place the insulator between the heat sink and the replacement transistor. Use the original transistor mounting hardware to mount the replacement transistor. Snap the transistor cover over the heat sink where used.

Most components are standard parts available through reputable parts suppliers. The parts listed here may be obtained from Bogen distributors, service agencies or directly from the factory. When ordering a part, specify the part number as listed, the model of the unit and give the series designation, which is a letter followed by numbers, printed on the chassis. For parts on circuit boards, also give the component board assembly number, which begins with "45."

When replacing transistors, use those made by the specified manufacturer. Transistors from other suppliers may not be satisfactory. Certain resistors must be Allen-Bradley products. These are designated by "AB" on the schematic diagram.

REPLACEMENT PARTS

Schem. Ref.	Part. No.	Description
		PC Board
—	**45-7062-01**	**PC board assembly**
C18	79-008-049	Capacitor, Electrolytic, 500 μF, 35V
C19, 22	79-504-032	Capacitor, tantalum, 2.2 μF, 15V
C31	79-112-001	Cap, electrolytic, 500 μF, 65V
C32	79-008-058	Cap, electro, 10 μF, 50V
C33	79-008-062	Cap, electro, 100 μF, 50V
C39	79-112-015	Cap, electro, 2500 μF, 50V
CR3-5	96-5333-01	Diode, 400 piv @ 1A
Q1-4, 7	96-5213-01	Transistor, 2N5089 or
	96-5346-01	Transistor, BC239C
Q5	96-5298-01	Transistor, SPS1910
Q6	96-5283-01	Transistor, MPSA55
Q8	96-5357-01	Transistor, 2SD-389 (P)
Q9	96-5356-01	Transistor, 2SB-512 (P)
R8	77-001-712	Control, 2 megohm
R27, 30	77-001-711	Control, 1 megohm
R42, 46	77-001-760	Control, 100 kohm
R47	77-001-710	Control, 200 kohm
R68, 69	76-107-096	Resistor, .82 ohm, 2W
		Chassis
C103	79-509-053	Capacitor, electrolytic, 1500 μF, 75V (C35)
	79-509-052	Cap, electro, 2000 μF, 75V (C60)
	79-509-051	Cap, electro, 3000 μF, 75V (C100)
CB101	94-0017-04	Circuit breaker, .93A hold (C35)
	94-0017-09	Cir. brkr., 1.65A hold (C60)
	94-0017-15	Cir. brkr., 2.5A hold (C100)
CB102	94-0014-07	Thermal breaker
CR101, 102	96-5241-01	Diode, 300 piv @ 3A
I101	94-0302-04	Pilot light assy, neon
Q101, 102	96-5385-01	Transistor, RCA 2N3055H (C35, 60)
	96-5397-01	Transistor, Solitron 2N3055 (C35, 60)
Q101-104	96-5397-01	Transistor, Solitron 2N3055 (C100)
R102, 103	76-116-003	Resistor, .27 ohm, 7W (C35, 60)
R102-105	76-116-003	Resistor, .27 ohm, 7W (C100)
SW101	81-003-050	Switch, ac, 3A (C35, 60)
	81-003-051	Switch, ac, 6A (C100)
T101	83-753-000	Transformer, power (C35)
	83-754-000	(C60)
	83-755-000	(C100)
T102	83-428-000	Transformer, output (C35)
	83-429-000	(C60)
	83-430-000	(C100)